MEDICINE

Cigarette Paper Tar

Study seems to show ashes and smoke from burning cigarette paper contain the chemical, 3,4 benzpyrene, which can cause cancer in mice.

➤ IS THE cause for the statistical link between cigarette smoking and lung cancer in the paper of the cigarettes?

A study seems to show that it is. In this study a chemical known to cause cancer in laboratory animals was found in the smoke and tar from burning cigarette paper.

The chemical is 3,4 benzpyrene. The finding was reported by Donald V. Lefemine, research chemist of the Cancer Institute, Miami, Fla., at the southeastern regional meeting of the American Chemical Society Birmingham, Ala.

To the lay person, this might seem as if the entire problem of cigarettes as a possible cause of lung cancer were now solved. To the layman, the only thing needed to make cigarettes safe would now seem to be treating the paper or using a plastic instead of paper.

Scientists, however, will take a different view. Mr. Lefemine himself apparently does not think he has the complete answer to the problem. He and his associates are now starting tests with samples of the material he obtained from burning cigarette paper to see whether this material will cause cancer in animals as pure 3,4 benzpyrene does.

One question scientists are sure to raise is, "How much benzpyrene is there in the cigarette papers?" If there are only small traces of it, this may not be enough to cause lung cancer.

Mr. Lefemine says that at very rough estimates there are one to three parts of the chemical in one million parts of the paper. He points out that when benzpyrene is diluted in solution to two parts in a million of the solvent, this will cause cancer in animals.

Second question sure to be raised concerns the temperature at which the paper was burned. Mr. Lefemine burned it at varying temperatures to correspond to the rate at which it would be burned in cigarettes smoked by slow and fast smokers.

Discovery of benzpyrene in smoke and tar from burning cigarette paper will not surprise chemists who say that, if one tries hard enough, one is sure to find it in any organic material.

However, in spite of a very determined search for it in recent years, no one yet has succeeded in finding it in cigarette smoke in more than tiny trace amounts. And how, some will ask, can it be found in the cigarette paper if it is not found in the smoke and tar from the whole cigarette?

The start for Mr. Lefemine's study came from H. J. Rand of the Rand Development Corporation, Cleveland. Mr. Rand several years ago burned cigarette paper and extracted from it a chemical he identified as benzpyrene. Not being a medical scientist, although cancer research is his "hobby," he did not publish his findings. Instead he turned the idea over to the Cancer Institute at Miami where the significance of the finding could, in Mr. Rand's opinion, be evaluated.

Mr. Rand credits the great inventor, Thomas A. Edison, with being the first to point the finger at the paper of cigarettes as constituting a health danger. Mr. Rand quotes an Edison letter to Henry Ford as follows:

"Friend Ford: I've studied cigarettes. The noxious part is the paper. It affects the brain."

At that time, however, Mr. Rand admits, cigarette paper was made from linen rags instead of the flax straw now used.

Finally, even if, and it is still if, cigarette paper contains a cancer-causing chemical in large enough amounts to be significant for human smokers, there is the still unanswered question of why one-pack-a-day men smokers aged 50 to 64 had death rates from heart disease more than twice as high as non-smokers, as found in the American Cancer Society's statistical study.

Science News Letter, October 30, 1954

CHEMISTRY

Man's Age Measured By New Method

➤ POSSESSIONS OF ancient man, wisps of fur or shreds of hide from man's forerunners on earth, can be dated more accurately by a new method of getting carbon 14 into gaseous form for the analysis.

Earlier methods deposited the radiocarbon separated from the antique sample as a smudge of soot in which the carbon was in solid form. The new technique, just being tried out, converts the tell-tale carbon isotope into acetylene gas.

This gas can be led through measuring devices and Geiger counters to give more accurate readings when plenty of material can be used, or good readings from rarer and smaller samples. The apparatus was demonstrated to visiting geologists at the Crust of the Earth Symposium, part of Columbia University's 200th anniversary celebration.

Carbon 14 age determination is only one of the methods by which ages of ancient materials, remains of once-living creatures and aggregations of rocks and minerals, can be dated.

At Columbia's Lamont Geological Observatory the ages of rocks are determined by the proportion of an original element to that of its associated daughter-element produced by radioactive decay. Potassium and argon are such a pair of elements studied by Dr. J. Laurence Kulp and his team of graduate students.

Argon, a heavy gas that forms no chemical compounds, is found trapped in the potassium minerals from which it has been produced by radioactive transmutation. Dr. Kulp's group has worked out a method of collecting this gas as it is set free, measuring it and, from its rate of formation, calculating the time necessary for its formation.

Work with other radioactive elements carried on at the new laboratory includes determination of tritium, strontium, uranium, lithium and lead. Origin of sulfur in salt dome oil fields is also sought by new methods of mineral study.

Science News Letter, October 30, 1954

CHEMISTRY

Discover Nature's Steps For Synthesizing Rubber

➤ WITH THE hope of saving many millions of dollars a year needed to stockpile natural rubber, a team of scientists has discovered the steps that nature uses in synthesizing rubber in the growing plant.

This promises a biochemical solution to finding a synthetic equivalent to natural rubber, whereas chemical approaches have been tried without success.

Although for many uses the synthetic rubbers perfected so successfully during World War II are as good or better than natural rubber, no synthetic has been made that has the low heat build-up of natural rubber, a property essential for making large size heavy-duty tires. To keep our big trucks running in an emergency, natural rubber has to be stockpiled at a carrying charge of $20,000,000 a year.

Research is therefore being pushed to get a synthetic, chemically-made rubber that will be satisfactory.

The scientists have found that the substance or monomer used in the plant to make rubber is the 5-carbon branched-chain compound, beta-methylcrotonic acid or a derivative of it. This substance is synthesized in the plant from acetyl-coA. Just how this compound is polymerized, that is, how big molecule chains are built up, must still be discovered, since polymerization of the 5-carbon monomer units has not yet been achieved outside the living plant.

Radioactive carbon was used to trace various chemicals through the rubber-making steps.

The scientists who report this progress in *Science* (Oct. 8) are: Dr. James Bonner of the California Institute of Technology, Marion W. Parker of the U. S. Department of Agriculture, Beltsville, Md., and Juan C. Montermoso of the QM Research and Development Center, Natick, Mass.

Science News Letter, October 30, 1954

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